TOWARDS A HISTORY OF GLASS IN THE ANCIENT NEAR EAST*

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The paper intends to investigate the transfer of specific technological achievements from one civilization to another within the ancient Near East. Its principal concern is with the appearance and the distribution of flasks and vases made of colored glasses in Babylonia, Assyria, Upper Syria, the region along the Mediterranean Sea and Egypt which are in evidence from the middle of the second millennium B.C. Philological as well as archeological evidence is utilized to establish the direction in which this invention spread across political and cultural boundaries. The approach is primarily lexicographic, based on certain key words attested in cuneiform texts from Nuzi, Ugarit, Qatna, Tyre, Ascalon, etc. The hypothesis is offered that glass was "invented" in Upper Syria and spread from there into Egypt as well as Mesopotamia.

When it comes to after dinner speeches, the philologist—let alone the lexicographer—is at a sore disadvantage compared with those who discourse beautifully on art, or interestingly on history. The philologist has but two choices: to make use of the jester's license traditionally granted the President of our Society, i.e., to tell his captive audience what to do or not to do—or, to try to interest his listeners in his own work—a difficult task, likely to produce boredom.

Because I love to take up such a challenge I am going to try to interest you in a search for the meaning of two Akkadian words, both apparently rather uninteresting, which has lead to unsuspected results. Perhaps I shall be able to convey to you some of the joys of discovery, some of the fun we have playing with words at the Chicago Assyrian Dictionary.

Let me retrace the steps of a lexicographical investigation of two rare words that began quite unconspicuously. The words are *eḫlipakku*[1] and *mekku*[2] and are both labelled as denoting "a kind of precious stone" in the two dictionaries, the *CAD*, and the *Assyrisches Handwörterbuch*. No further investigation appeared either urgent or promising until—as it often happens in Assyriology—a new text appeared which changed everything.

References for *eḫlipakku* occur in a list of temple jewelry from Qatna, a tablet from Alalakh,[3] as well as in an inventory of objects sent from Mitanni to Egypt, and in other Amarna letters, also in a Nuzi text, all from the middle third of the second millennium. There is little point in discussing them individually since the suggested meaning "a kind of precious stone" fits these contexts perfectly. Even the use of the word to describe a garment, or rather its color, in a Hittite text from Boghazkeui, does not contradict the translation. To boot, such scholars as Benno Landsberger and Emile Laroche, have provided us with etymologies for *eḫlipakku*, Landsberger with a Sumerian[4] and Laroche with a Hurrian etymology.[5]

However, I prefer to avoid the "etymology game," and would rather concentrate on those passages in which the proposed translation does not fit so readily.

Let me begin with the occurrence of *eḫlipakku* in one of a group of seven Amarna letters, which

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[1] See *CAD* and *AHw.* s.v. and cf. note 3.

[2] See *CAD* and *AHw.* s.v. and cf. note 10.

[3] The passage Wiseman, *Alalakh* No. 440: 6-8 has so far escaped the attention of the lexicographers. I have to thank Professor Anne D. Kilmer for drawing my attention to it. It lists 1-*en a-ar-za-ar-ni eḫ*(!)-*li*(copy *še*)-*ba-ag-gi* and 1-*en ma-áš-ḫé* KÙ.GI *ḫi-a-ru-uḫ-ḫé ši-na-am-ni ma-ni-in-ni eḫ-li* (copy *tu*)-*ba-ag-gi*.

[4] B. Landsberger proposed to connect *eḫlipakku* with the name of the precious stone *ḫilibû* (Sum. ḫ i . li . b a) to which belong also the designations *girimḫilibû*, *amarḫilibû* and *amargirimḫilibû*.

[5] E. Laroche in *Ugaritica* 5, 457 refers to Hurrian *eḫli* "sauver."

were addressed by the ruler of the town of Ascalon to the Pharaoh. These letters are full of stereotyped protestations of loyalty for Egypt and of obedience to the Egyptian regent stationed in that city. Only one of them, *EA* 323, deviates and the pertinent passage runs as follows: "as soon as the king, my lord, ordered *eḫlipakku* stones, I sent indeed thirty *eḫlipakku* stones to the king, my lord (lines 13-16)." The same *eḫlipakku* "stone" we find also in the fragmentary letter, *EA* 327, where the name of the writer and that of his city are lost. There, basically the same situation prevails as in the letter from Ascalon. The pertinent passage runs: "the king, my lord, has written for *eḫlipakku*-stone (and) now I am bringing one weighing 50 (units) to the king, my lord."

Another reference appears in *EA* 314 which belongs to a group of three letters sent from the town of Jurṣa to Egypt. This little known town seems to have been located in the southern coastal plain, possibly along the *via maris*.[6] Here *eḫlipakku* is mentioned, again in a context nearly identical in tenor and content with those already cited: "When the king, my lord, ordered *eḫlipakku*, I sent (it) to the king, my lord, my god, the sun in heaven (lines 17-22)."

In our search for more revealing references for the stone *eḫlipakku*, we turn now from Palestine to Ugarit which offers us indeed the key passage, furnishing the reason for today's topic.

The text was published rather recently, in 1970, in *MRS* 12 as No. 6. From the royal palace of Ugarit comes a group of six letters addressed to the city governor (*sakin*) of that city, all dealing with trade, more exactly: overland trade.[7] The transactions are styled as exchanges of gifts among persons of equal status and the tone is pointedly polite, not to say courtly; instead of speaking of demand and supply, the writers refer to wishes and gifts, and the Sumerian term ŠÁM is used in its old sense of "equivalent" rather than in that of "purchase price." It is interesting to take a look at the nature of the merchandise which was in this way imported into Ugarit and at that which was exported. Into the capital went domestic animals such as sheep, donkeys, mules and horses; in a few instances textiles—mainly linen garments—multicolored belts and purple-dyed wool and an iron dagger. All this was to be paid for mainly in gold, also in silver, in two instances in copper kettles and once, in letter No. 6, the governor was asked to pay in—*eḫlipakku*.

The nature of the merchandise changing hands suggests that products of rural industries were exchanged primarily for gold and silver, while certain city products such as copper kettles, a dye stuff[8] and—*eḫlipakku*, appear to have been in demand as well.

Still, even in this context, the meaning "a kind of precious stone" for *eḫlipakku*, seems to be confirmed or is at least not ruled out.

However, there is more to the letter from Ugarit. The "stone" wanted is in fact called *mekku* by the scribe, a designation which he finds for some reason in need of an explanatory gloss, and so he adds, after a "Glossenkeil," the word *eḫlipakku*. Thus we have two words now for the same thing.

That this is in fact so is unexpectedly confirmed by an Amarna letter in which *mekku* occurs in exactly the context I have just pointed out for *eḫlipakku*.

This letter, *EA* 148, belongs to a group of ten written to the Pharaoh by Abimilki, the king of Tyre. Nearly all of them describe the desperate situation on the island city after the enemies had taken the mainland settlement and thus prevented Tyre from obtaining fresh water and firewood. Pleas for help and inordinately flowery protestations of loyalty abound.[9] The letter in question mentions the *mekku* stone after an unusually short introduction of only three lines—probably in order

[6] For a proposed identification of Jurṣa see B. Mazar "Yurzah = Tell Jemmeh" in *Bulletin Israel Exploration Society* 16 (1951), 38-41 (in Hebrew) and English Abstract p. 11 (Communication of Prof. A. Malamat).

[7] The group of letters addressed to the governor are published in *MRS* 12 as No. 4 to 7 and No. 9. Two of them (No. 4 and No. 9) are so damaged that they are worthless for the present purpose. No. 7 contains two independent letters written by two different persons, a woman and a man. It should be noted that the letter No. 16 which is not addressed to the governor deals with the same topic.

A letter of the governor himself is published as No. 8; it contains demands for seeds of certain plants used as dyes (wr. *ḫūrati* in l. 7 and *ḫurḫurāti* in line 9) and for a donkey to be handed over to the messenger carrying the letter.

[8] For *ḫūratu* see my remarks in *JCS 21* (1967, published 1969), 242 and B. Landsberger, *ibid.* 170.

[9] See the remarks of W. F. Albright in "The Egyptian Correspondence of Abimilki, Prince of Tyre," *JEA* 23 (1937), 190-203.

to express the urgency of the communication. It runs "The king, my lord, has written me about the *mekku*-stone[10] which is in my possession (but) I have already given the king, my lord, (one) weighing one hundred (units). The king, my lord, should (therefore) look with favor upon his servant and give (back) to him Ušû (the mainland settlement of Tyre) (lines 4 to 12)."

Here, we find again what we have already observed with respect to *eḫlipakku*: it is always the Egyptian king who wants these particular "stones" and never any other commodity, from the local rulers of Palestine—be it Tyre, Ascalon or Jurṣa.[11] The importance of that material is underlined when these kinglets either promise delivery or point out that they have already delivered it, often giving the exact weight of the "stones." Abimilki of Tyre is even desperate enough to base his claim for immediate Egyptian help directly upon his delivery of *mekku*- stone.

What stone, one is now bound to ask, can the Pharaoh be in such need of that he keeps writing for it to these petty rulers of a region which he neither militarily nor politically can control or hold any longer?

So far, our discussion of the references for *eḫlipakku* has brought us no evidence that *eḫlipakku* is anything but a stone. This holds true also for *mekku*; we know from a number of good Akkadian texts that beads used as charms are quite frequently said to be made of *mekku*.

Fortunately, we have now a new reference for *mekku* which changes the entire picture.

My book, "Glass and Glassmaking in the Ancient Near East" has just been published and it contains the Assyrian prescriptions for making colored glasses. There *mekku* occurs in contexts that unmistakably establish it as a word for glass; to be more exact, for glass as the raw material used by craftsmen who fashion the glass containers, beads, etc., of that period.[12] Let me stress that *mekku* is not the term used ordinarily in the glass prescriptions; it appears in fact only in one prescription which is atypical as to terminology and technology. It obviously represents a local tradition about glassmaking which was included in the corpus of glass texts as they were copied and assembled for a royal tablet collection earlier than that of the library of Assurbanipal,[13] probably in the twelfth century B.C. Attested in Assyria, in Tyre and Ugarit, the designation *mekku* is most likely to be considered a foreign, probably a West Semitic word for the kind of glass which, in the Hittite capital, in Alalakh, Ugarit, Qatna, Jurṣa, Ascalon and Nuzi, was called *eḫlipakku*.

In the region where the letter No. 6 that was sent to the governor of Ugarit originated the word for raw glass must have been *mekku*. The scribe evidently did not expect the recipient of the letter to be familiar with that term, and so he added the Hurrian expression *eḫlipakku* as a gloss. In Palestine proper, as we have seen, the latter was used, at least in Jurṣa and Ascalon, while the king of Tyre wrote *mekku* when referring to the same material.

But, my present concern is not just with these two words for glass but with a more far-reaching topic.

My point of departure is the question: How does it come that the Pharaoh is clamoring for the delivery of raw glass from Asia when Egypt, at that time, boasts of a wide array of beautifully made glass objects in Egyptian style, hence, made in Egypt? If indeed raw glass had to be imported into Egypt, the history of that material in the ancient Near East would appear in a new light.

It is therefore necessary to give you an outline of our knowledge of that history on the basis of extant objects, their shape and their technology,

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[10] The reference is not listed in *AHw.*, probably due to its atypical spelling: NA_4 *me-ku*.

[11] There are two exceptions, one furnished by *EA* 77 which refers to a letter of the Pharaoh requesting copper, and another by *EA* 126, in which the king of Byblos refers to the Pharaoh's demand for boxwood (*taskarinnu*) which Byblos boats used to bring from Ugarit and the country Zaḫi to Egypt (lines 4-6). See also M. Liverani "Le lettere del Faraone a Rib-Adda" in *Oriens Antiquus* 10 (1971), 253-268 with notes 25 and 45 referring to the topic under discussion.

[12] For the vessels cf. Dan Barag, "Mesopotamian Vessels of the Second Millennium B.C." in *Journal of Glass Studies* 4 (1962), 9ff., and, same author, in A. Leo Oppenheim et al., *Glass and Glassmaking in Ancient Mesopotamia* (Corning 1970, published 1972), in the chapter (pp. 131-199) "Mesopotamian Core-formed Glass Vessels (1500-500 B.C.)" and Axel von Saldern, (*ibid.* pp. 203-228) in the chapter "Other Mesopotamian Glass Vessels (1500-600 B.C.)"

[13] For the problem of the prototypes of the prescriptions for making colored glasses found in the library of Assurbanipal, see my book pp. 27f.

leaving aside for the moment all documentary evidence.

Glass appears in the ancient Near East like an alien intrusion in the over-all technological evolution and presents, as such, a fascinating problem.

From the fifteenth century B.C. onward, the work of the glassmaker is in evidence all over Babylonia and Assyria. The very first centuries of this development can in fact be called the "Golden Period" of Mesopotamian glassmaking. Its beautiful products were excavated in such sites as Ur in the south, Nippur, Babylon, Dur-Kurigalzu in Babylonia, Assur, Nuzi, Tell er-Rimah, Tell Brak, Chagar-Bazar in Assyria, and Alalakh in the west. The point here is that we know of no earlier glass product, less perfect from the point of view of technology.[14] On the contrary, the sophistication and technical know-how is most pronounced at the very onset of the period.

With the same—I am inclined to say dramatic—suddenness, glass makes its appearance also in Egypt, likewise in the fifteenth century, often with the same characteristically shaped glass objects and the same techniques used to produce them. Again there is no evidence for preparatory stages, no previous attempts are known, no gropings for technological achievements or artistic formulations.

In the region between the Mediterranean and the Euphrates the archeological evidence is rather slim. With the exception of Alalakh and Ugarit, no glass objects have been found as yet. Some pertinent textual evidence, however, comes from the Hurrian kingdom of Mitanni. The letters and inventories listing golden utensils, jewelry and other costly furnishings sent to Egypt on the occasion of a dynastic marriage, enumerate many items either made of or decorated with colored glasses of various shades. Obviously the Mitanni craftsmen of the early fourteenth century knew very well how to produce imitations of lapis lazuli as well as opaque glasses of other colors. And now we can add Palestine to the regions which knew of glass and traded in it, as we have found in the cited Amarna letters.

Where then and by whom was glassmaking developed, and how can one account for the peculiar distribution of its products in time and region which I have just outlined for you?

Before going any further, one important point has to be made. The artisans of the ancient Near East, from Anatolia to Egypt and eastward to the Persian Gulf, knew from the fourth, even the fifth millennium B.C. onward, how to produce colored glazes. They applied thin, colored glazes to faience-like carriers such as beads, small ornaments, at times even wall tiles, knobs, and small bowls. These glazes I call in my book "primary glasses." They are chemically very similar to the opaque and strongly colored glasses that make their appearance suddenly in the fifteenth century B.C. The latter I call "secondary glasses."[15]

Both glazes and glass are made of a mixture of sand and the ashes of certain plants to which were added metal compounds as colorants. Glass was therefore not simply "invented" in the fifteenth century B.C. What actually happened was a change in glass technology.[16] Instead of producing glazes that were used like paint on formed objects, craftsmen now created opaque and intensely colored glasses; they fused and fashioned them into objects made entirely of glass. Unprecedented techniques were applied to shape the glass when still hot and this resulted in the beautifully decorated vessels and flasks of that period. Moreover the change just described seems to have taken place nearly everywhere simultaneously.

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[14] This statement has to be qualified. A piece of raw glass was excavated in Eridu in the deep south of Mesopotamia (see my book p. 62 n. 64 and p. 83 n. 109) and another one in Tell Asmar in the Diyala region (see ibid. p. 83 n. 110). Both are dated by their excavators to much earlier periods even though the specific archeological contexts in which they were found are both somewhat doubtful. There is also some admittedly circumstantial philological evidence which points to the use of artificial lapis lazuli in Mari (see *ibid.* p. 83 n. 108). If it should be proven that this evidence actually attests the manufacture of colored opaque glasses in the first half of the second millennium B.C. in isolated instances, this would in itself not argue against my contention that glass makes its appearance only in the middle of that millennium. We are dealing here with a predictable change in technology and not with a new and unheard-of invention, so that accidental and isolated discoveries by individual craftsmen can be presumed to precede the wide spread of a technique that became quickly fashionable.

[15] For a discussion of these terms see my book pp. 19, 36, 63, 84f.

[16] See *ibid.* pp. 85f.

All these considerations should help us to evaluate the over-all situation and to restrict the possibilities involved.

Already in my book on the glass texts I have argued for a "Western" origin of glass technology, though on purely philological grounds: I pointed out that the terms used for the "primary glasses" in Sumerian as well as in Akkadian texts do not belong to any of these two languages, and that those for the "secondary" glasses are either isolated in Akkadian or clearly West Semitic.[17]

This hypothesis of a Western origin can now be supported by the appearance of the probably non-Akkadian term *mekku* in texts from Tyre and Ugarit, and by the use of the Hurrian term *eḫlipakku* for the same raw glass, and by the new evidence for the import of raw glass from Syria into Egypt.

If the substance called either *mekku* or *eḫlipakku* is indeed a raw glass which the Pharaoh demanded from certain Asiatic princes who either acquired it through trade or directly from glassmakers, then the following conclusions should be acceptable. The craftsmen who produced the magnificent glass objects for the Egyptian court depended for their basic raw material, or for an essential ingredient thereof, on imports from Asia. And this in spite of the fact that all ingredients necessary to produce glass objects were abundantly available in Egypt. Hence, it seems that glass objects were made in that country—at least originally—not by native craftsmen but by "Asiatics." The latter then must have brought with them the art of working with glass and they required for practical or traditional reasons that specific type of raw glass with which the Pharaoh tried to provide them. The use of the probably West Semitic *mekku* and of the evidently Hurrian *eḫlipakku* for that material points either to the region of its origin or to the region from where the craftsmen themselves may well have come.

The most likely candidate for this region is Upper Syria. Quite possibly, the Egyptians and the Mitanni glassmakers came into contact when that country was conquered by Thutmosis III. The glassmakers would then come to Egypt as prisoners of war and started there to produce their wares—in Egyptian style.[18]

An argument in favor of my hypothesis can be adduced by comparing Egypt and Mitanni as glass-producing regions: In Egypt the glass objects which are attested beginning with the fifteenth century B.C. disappear in the eleventh century. Only much later, in the Hellenistic period, glass appears again in Egypt, under obvious foreign influence.

The situation in Upper Syria is quite different. I have already remarked on the large variety of colored glasses mentioned in the texts from Mitanni. The technological level on which these colorful and opaque imitations of precious stones were produced was soon surpassed there. First, translucent glasses appeared instead of opaque ones, then molds were used for making glass containers, not to speak of the practice of cutting containers out of a block of glass as if it were a stone. These developments did not stop in 612 B.C. with the downfall of the Assyrian empire which in many respects fell heir to the artistic traditions and technological achievements of the Mitanni empire. Another technological change took place again somewhere in Upper Syria after the Persian conquest, when glassmakers began to blow a very hot glass—which was transparent—first into molds and then freely into elegant forms. Apparently the tradition of the glassmakers' craft in Syria was not affected by the disappearance of either the Mitanni or the Assyrian empires.

I cannot offer any ready explanation for the telling contrast between the stagnation evident in Egyptian glass technology and the several progressive changes in the way glass was used in Upper Syria. Yet the difference may well be that one was an imported, the other a native technology.

In order to evaluate the probability of the just presented hypothesis let me touch briefly on the phenomenology and the mechanics of inter-cultural contacts within the area of the ancient Near East.

For this purpose we have to establish the social level on which such contacts were typically taking place, and to investigate direction and depth of specific foreign influences.

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[17] See *ibid.* pp. 57, 84.

[18] Here, a qualification is in order. Thea Elisabeth Haevernik has pointed out in her article "Assyrisches Millefioriglass" in *Forschungen und Berichte, Archäologische Beiträge, Staatliche Museen zu Berlin*, Vol. 10 (1968), 67, that the earliest datable Egyptian glass vessels exhibit in form and decoration Mesopotamian influences. This observation, once documented, will lend support to the hypothesis here offered.

The foremost, if not the only level on which the civilizations of the ancient Near East come into peaceful contact is that of the royal court. There, foreign influences are most effective; there, they are readily accepted and endowed with the king's prestige which ensures them a wide diffusion within the country.

As is evident from countless references in historical texts, in treaties and letters from royal archives, the courts of the kings all over the ancient Near East—from Elam to Egypt—were in contact with each other for more than two millennia. Of course, the intensity of such contacts as well as their geographical reach varied considerably and so did their duration. Some courts were centers of diffusion of ideas and techniques by virtue of the political and military power of their kings, such as those of the great empires of Mesopotamia. Other courts lacked such powers and yet functioned likewise as centers of diffusion. As a matter of fact, political and military power do not necessarily promote intellectual and artistic influences across boundaries.

It has been established by now that many specific technological achievements, characteristic intellectual attitudes, certain refinements in the arts, in craftsmanship, in civilized *savoir-vivre*, have in the ancient Near East spread from West to East. And this is also the way in which glass and glassmaking must have come from somewhere in Upper Syria into Mesopotamia in the fifteenth century B.C.

A good parallel to the spread of the new glass technology is furnished by that of certain contemporary textile techniques. Foremost are those for dying wool and the abundant use of colored wools for the decoration of linen garments. The pertinent technical terminology enables the philologist to follow this development from Upper Syria, via Assyria and Nuzi, into the Babylonia of the Chaldean period in spite of the fact that no trace of any such fabric has survived.[19] Further parallels are provided by the Assyrian kings' acknowledged imitations of Western style buildings in their royal palaces, also by the preference for Western metal work, Western furniture decorations and landscaped gardens in Assyria.[20] There are bound to be other instances and they will come to the fore when Assyriologists will lend more attention to technology and related topics.

The network of interstate contacts from court to court is active on several levels, such as the peacetime exchange of gifts between kings, delivery of tribute, the spoils of war or intercity commerce.

I would like to concentrate here on the peacetime exchange of gifts because it involves finished objects rather than raw materials, which are of minor importance, gold and lapis lazuli perhaps excepted. After all, finished products are, from the technological point of view, more interesting than raw materials.

The gifts exchanged consist typically of costly clothing, jewelry, precious metals, or household furnishings using rare woods. At times, such exchanges can be so numerous as to replace or, at least, to supplement international trade in luxury goods. However, gift exchanges on the one hand and tribute or trade deliveries on the other differ clearly inasmuch as the former deals with individual pieces or sets of objects, the latter typically with quantities of identical objects.[21]

Whatever the economic or political motivation for their delivery, clothing, jewelry, prestigious utensils stimulate the desire for more such treasure and this often leads to the exchange of artists and craftsmen specializing in the manufacture of these goods.

A considerable impetus to the court's receptiveness to foreign products together with their manufacturing techniques comes, of course, from dynastic marriages, and the same goes for foreign mores and ideas. We have, in this respect, little direct evidence from Mesopotamian sources, but foreign princesses did come to Babylon as well as to the Assyrian capitals. The Old Testament, however, is quite outspoken about the nefarious influences of such foreign ladies.

One could characterize this entire situation as a case of *horizontal* diffusion of techniques and their products, a diffusion extending on the same social level through different countries. There exists a subsidiary system of diffusion and that works within the same country. Through it techniques, materials, finished objects are distributed, so to speak, by "percolation," from the

[19] For a discussion of the problems here involved see my article "Essay on Overland Trade in the First Millennium B.C." in *JCS 21* (1967, published 1969), 246f.

[20] See my article "On Royal Gardens in Assyria" in *JNES* 24 (1965), 328-333.

[21] See Cyril Aldred "The Foreign Gifts Offered to Pharaoh" in *JEA 56* (1970), 105-116.

court downward to the social strata of the officials, the military, the landowners, the merchants, etc. This I would like to call "vertical" diffusion. Both systems contribute toward a fast and effective spread of technical innovations and new ideas throughout the ancient Near East.

However, what is called in the loose and inexact parlance of the philologist "the spread of technological innovations" makes sense only when one realizes that technology forms a well-defined, in fact, quasi-independent sector in each culture complex. Its applications range from the level of subsistence to that of prestige. Here belong agricultural and habitation technologies, those concerned with defense, personal adornment, etc.

Within each such technology the end product results from the interaction of several discrete constituents such as the nature and the technical potential of the raw materials available; ecological contingencies; social and economic demands; artistic preferences and technical know-how. Most of these constituents are relatively constant and as a rule only catastrophic deficiencies or upheavals affect the functioning of a specific technology. But the variable which I called "technical know-how" is subject to fundamental changes. And these changes are due to impulses from the outside, in other words, they are released by information originating in other cultures.

Internal developments seem to have played a rather restricted role within the variable called "technical know-how." Therefore departures from, or decisive improvements of traditional practices, such as new working methods, the use of new raw materials and different form types, or the transfer of technical practices from one field of application to another, all these are rarely attested. The absence of specific technological evidence may well be caused by the perishable nature of most of the products involved, the lack of written records or simply our ignorance.

Since peaceful intercultural contacts take place in the ancient Near East exclusively on what we could call the "diplomatic" level, namely by exchanges of gifts between rulers, visits of ambassadors, and dynastic marriages, prestige technologies are likely to change while subsistence technologies remain basically stable. The latter only occasionally profit from the import of better raw materials through overland trade.

A telling example for the spread of technological information under favorable conditions is furnished us by the cuneiform texts which contain prescriptions for making colored glasses. Such conditions prevailed during the overall equilibrium of political power of the Amarna Period which permitted the free flow of technological information from court to court.

Though there is hardly any direct evidence for this interchange of technological information the following considerations may well bear it out.

The glass texts of the library of Assurbanipal go back, as I have shown in my book, to originals written in Assyria in the twelfth century if not somewhat earlier. These prototypes are therefore contemporaneous with a group of Assyrian tablets containing prescriptions for making perfumes. In about the same period texts for training fast chariot horses are likewise attested in Assyria. The latter have, moreover, a counterpart in Hittite tablets of similar content and tenor, as do, by the way, also the glass prescriptions.[22]

These three types of texts which appear nearly in the same region and period seem to me to be united by their subject matter. I suggest that they represent a concerted effort of the Assyrian royal court to promote crafts considered at that time essential for royal prestige. Apparently every ruler of the Amarna Age and the subsequent centuries simply had to have fast chariot horses, new perfumes and beautiful glassware. The know-how for producing them was restricted to specialists who either migrated or were sent from court to court—as were the famous physicians of this period of intense diplomatic contacts.[23] It is also possible that specialists were captured in wars, which quite likely was the case of the Mitanni glassworkers who were brought to Egypt—as I have suggested. The desire of the Assyrian court to become independent of this interchange of information carried typically by migrating craftsmen and technicians may have prompted the writing down of the essentials of these three

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[22] Apart from the mysterious tablet HT 3 (BM 108561) from Boghazkeui which I discussed in my book pp. 67f., there are two Hittite texts dealing apparently with glass-making to which Professor H. G. Güterbock has drawn my attention: *KBo* 6 65 and 18 201.

[23] For evidence see simply *CAD asû* A usage a-3′.

[24] For the early perfume prescriptions see my book p. 5 note 5 and for an isolated Neo-Assyrian text of that type *Iraq* 13 (1956), 112 ND 460.

crafts—glassmaking, perfume making[24] and horse training.[25]

This brings me to the end of my talk. Just two Akkadian words have given us the rare opportunity of tracing specific technological changes. It so happens that we are dealing here with a period relatively well attested by documentary as well as archaeological evidence. We did not have to resort to ingenious hypotheses which cannot be proven as is the case in the study of essential technological stages of metallurgy or weaving. Moreover, the two words *mekku* and *eḫlipakku* have shown us the direction and mechanics of technological contacts which in turn have allowed us to draw conclusions that may, one day, apply to similar situations in other fields of intercultural connections.

What more can the lexicographer hope for?

[25] See Anneliese Kammenhuber "Zu den hethitischen Pferdetexten" *Forschungen und Fortschritte* 28 (1954), 120 and *Hippologica Hethitica* (Wiesbaden 1961), 31.